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An Embedded Based Integrated Flood Forecasting through HAM Communication

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ABSTRACT

The most essential resource for all living beings on the planet is water. There is only three percentage of fresh water among all water resources and two thirds of the freshwater is locked up in icecaps and glaciers. Of the remaining one percent a fifth is in remote areas where abundant seasonal rainfall and the monsoons deluges and hence the water cannot be used. At the same time flooding is also one of the most frequent and detrimental natural disasters in the world. In this embedded world an advanced and intelligent system is in the need to defend the human life from these disasters. This project provides a solution for the floods that are occurring. The main function of this project is to identify and detect the floods that occur abruptly, through the technique called HAM communication.

Keywords: Floods, Forecasting, Embedded, HAM Communication, Rainfall, Disasters, Freshwater.

1. INTRODUCTION

This project implements through a technique called HAM communication which describes the use of radio frequency spectrum for purposes of non-commercial exchange of messages such as voice, text, wireless experimentation, self-training, private recreation, radio, sport, contesting and emergency communication. The term "HAM" refers to ‘amateur’ which is used to specify a duly authorized person interested in radio electric practice with a purely personal aim and without pecuniary interest. The amateur radio service is established by the International Telecommunication Union (ITU).

The project consists of two working modules namely; Flood monitoring and Control unit. The flood monitoring unit consists of humidity sensor, Temperature, water level, Rain gauge sensor on different zone arrangements. The sensor signals can be transmitted to the control unit through HAM communication. The receiver at control unit receives the alert signal in voice bank through the speaker coming from the flood forecast monitoring unit. The receiver at control unit sends the output signal to lamp and shutter. Thus, the system is very cost effective and it can also perform precise operation for saving human life.

2. PROBLEM IDENTIFICATION

Flood decision support system is effective to apply the Grid infrastructure and to integrate the distributed data resource on different sites. It connects heterogeneous resource and provides a uniform service interface for agents to access and process data. Upper most layer is the infrastructure layer, the middle-ware layer provides a run-time environment for agents where multi-agents could communicate and interact to exchange the partial knowledge. This is called the hierarchical system Agent Grid, which is parallel and distributed software that integrates exiled agent services agents' run-time environment and development tool-set on the grid infrastructure. In the Agent Grid, several useful tools are integrated with generic and data grid mechanisms. This system could not interpret the exact information about the whereabouts of all the floods. Hence this system was not a very operative one. The design of

water level measurement using multi-sensor evaluation is a method that uses various sensors to measure the level of water. The microwave water level sensor combines high accuracy with low sensitivity to variations in air temperature and humidity but differs from other water level sensors in utilizing an unconfined radar beam aimed vertically downward to the water surface. Many potential benefits of using microwave radar sensors for short-term flood advisories and long-term sea level monitoring have been identified by several organizations throughout the ocean observing community.

3. PROBLEM SOLUTION

The geologists and researchers had come with a resolution taking into account the drawbacks of other flood forecasting techniques. It is clearly seen that the proposed methods could only identify the water level or may perhaps only detect the invasion of floods, whereas this prevailing system incapacitates those drawbacks and taking into account those features has evolved with the idea of flood forecasting through HAM communication.

3.1 Block Diagram

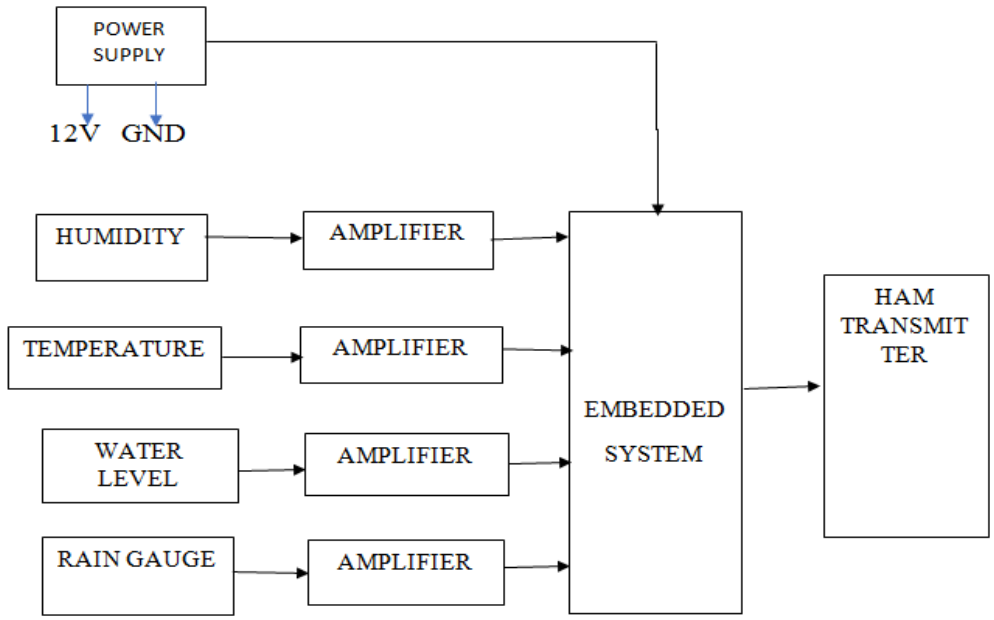

Fig 1 Block Diagram of Flood Monitoring Unit

3.2 Block Diagram Description

This technique consists of two units which are the flood forecasting unit and control unit. The flood forecasting unit consists of power supply, humidity sensor, temperature sensor, amplifier, microcontroller, and HAM transmitter and HAM receiver. The warmer the air is, the more moisture it can hold, so relative humidity changes with fluctuations in temperature. Temperature sensors are devices used to measure the temperature of a medium. There are 2 kinds on temperature sensors: contact sensors and noncontact sensors. However, the 3 main types are thermometers, resistance temperature detectors, and thermocouples. An amplifier is any device that changes, usually increases, the amplitude of a signal. Here we can use embedded microcontroller that PIC IC 16F877a. Finally, in flood forecasting unit a signal is transmitted from HAM transmitter to HAM receiver in Control unit.

3.3 Circuit Diagram Description

Power supply gives supply to all components. It is used to convert AC voltage into DC voltage. Transformer used to convert 230V into 12V AC.12V AC is given to diode. Diode range is 1N4007, which is used to convert AC voltage into DC voltage. AC capacitor used to charge AC components and discharge on ground. LM 7805 regulator is used to maintain voltage as constant. Then signal will be given to next capacitor, which is used to filter unwanted AC component. Load will be LED and resistor.

3.4 Circuit Diagram of Transmitter Unit

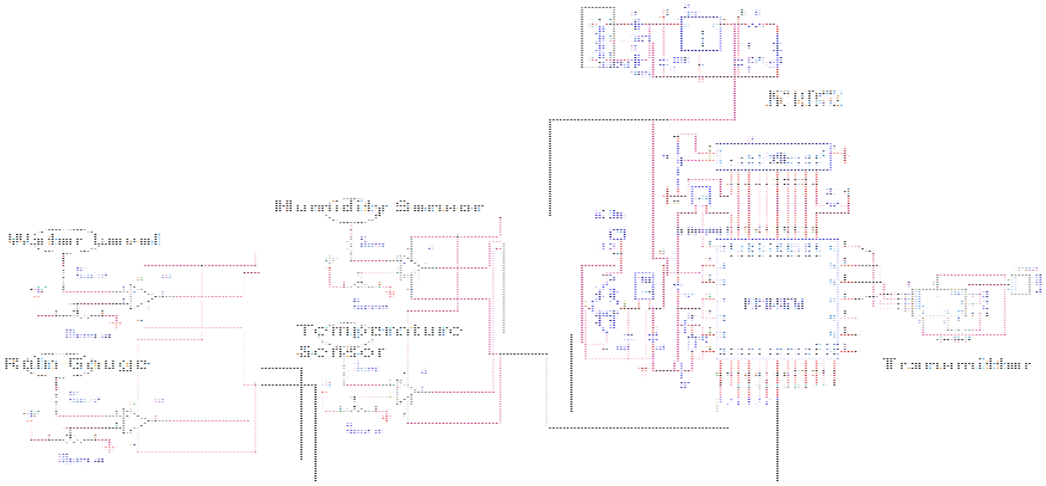

Fig 2 Circuit Diagram of Transmitter Unit

3.5 Circuit Diagram of Receiver Unit

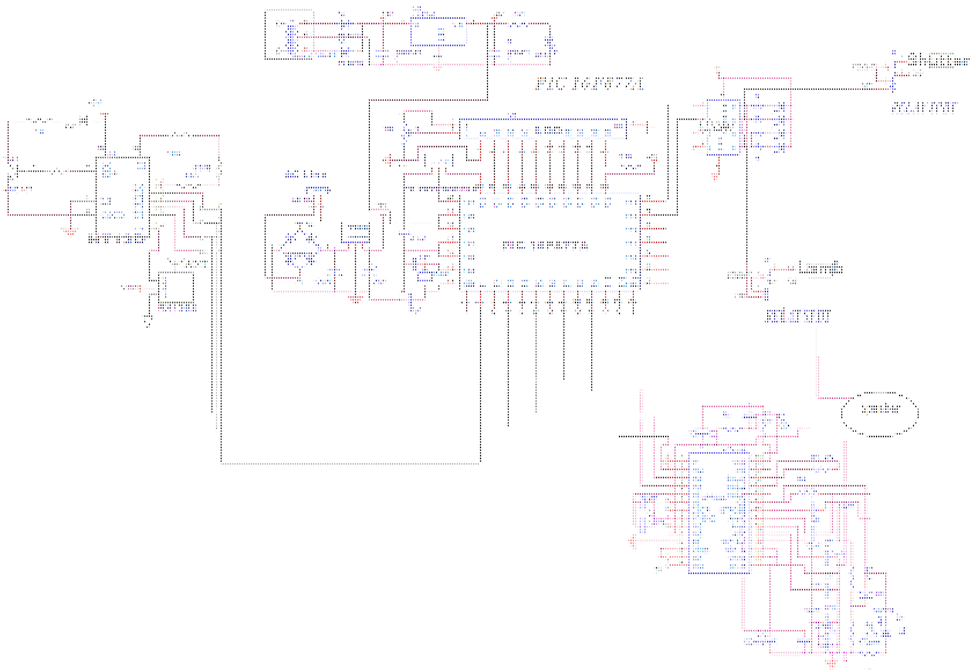

Fig 3 Circuit Diagram of Receiver unit

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4. RESULT AND DISCUSSION

This chapter deals with the outcomes of this project. Fig 6.1 shows the initial setup of both the flood monitoring unit and the control units. There are various sensors inbuilt within it which shows when the shorelines are about to rise indicating the onset of floods. The humidity, temperature and rain gauge sensors detect the respective readings beforehand making it easy to identify the onset of floods. As soon as the floods are detected, the message is sent to the littoral folks about the commencement of floods warning them about the level of floods. At the same time there is a speaker alert announcing about the detection of floods. Fig 6.2 shows the flood detected message. Throughout this whole project PIC microcontroller plays a major role on both the transmitting and the receiving side.

Fig 4 Initial setup of transmitter and receiver units

Fig 5 Flood Alert message

5. CONCLUSION AND FUTURE ENHANCEMENT

This paper was motivated to address the gap in the development and application of integrated information system in water resource management. The results show that the water resource management is greatly benefited by such an integrated system for decision-making and detailed tasks. The sensor signals can be transmitted to the control unit through HAM communication. The receiver at control unit is receiving the alert signal in voice bank through the speaker coming from the flood forecast monitoring unit. The receiver at control unit is receiving the output signal to lamp and shutter. Thus, the system is very cost effective and also it can perform precise operation for saving human life. In future this method can be modified by using inbuilt sensors instead of external sensors.

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